Veritas CommandCentral™ Getting Started Guide

for Microsoft Windows and UNIX

5.1

symantec™

CommandCentral™ Getting Started Guide

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Technical Support

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For information about Symantec's Maintenance Programs, you can visit our Web site at the following URL:

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Customers with a current maintenance agreement may access Technical Support information at the following URL:

www.symantec.com/techsupp/

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- Hardware information
- Available memory, disk space, and NIC information
- Operating system

- Version and patch level
- Network topology
- Router, gateway, and IP address information
- Problem description:
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  - Troubleshooting that was performed before contacting Symantec
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To access more information about Enterprise services, please visit our Web site at the following URL:

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Getting started with the CommandCentral family

This document includes the following topics:

- About the CommandCentral family
- About Veritas CommandCentral Storage
- About Veritas CommandCentral Storage Change Manager
- About Veritas CommandCentral Enterprise Reporter
- Getting CommandCentral up and running
- Where to find more information about CommandCentral

About the CommandCentral family

The CommandCentral family includes the following modules:

- CommandCentral Storage: A storage resource management solution that provides centralized visibility and control across heterogeneous storage environments while reducing risks and costs.
  For more information, refer to the following:
  See "About Veritas CommandCentral Storage" on page 8.
- CommandCentral Storage Change Manager: A storage change management solution that provides insight into storage infrastructure related changes in your data center, helping you to ensure the availability of your storage infrastructure, manage service level agreements more effectively, and improve operational efficiency.
  For more information, refer to the following:
  See "About Veritas CommandCentral Storage Change Manager" on page 18.

- CommandCentral Enterprise Reporter: Provides a global view of storage assets mapped to your organization, business insight about inventory and utilization, on-demand customized reporting, and personalized dashboards.
  For more information, refer to the following:
  See "About Veritas CommandCentral Enterprise Reporter" on page 20.

About Veritas CommandCentral Storage

Veritas CommandCentral Storage by Symantec represents an entire storage resource management (SRM) solution, giving you what you need to manage your storage infrastructure more effectively. It gives you the following capabilities:

- Offers a single console from which data center administrators deploy, manage, and expand a multi-vendor networked storage environment. The CommandCentral Storage Console seamlessly integrates performance and policy management, storage provisioning, and zoning capabilities to ensure that the storage infrastructure runs as efficiently as possible. The Console enables users to set policies that automate notification, recovery, and other user-definable actions.
- Discovers and tracks the utilization and allocation of storage resources down to the disk level. The reporting features in CommandCentral Storage provide a complete and detailed view into precisely how and where storage—for office documents, files, applications, email, and databases—is used in your enterprise.
- Shows usage trends and makes forward projections. You can gather data both locally and remotely (through a managed host). This means you can get baseline information without huge deployment costs. Armed with this data, you can do predictive modeling to analyze the return on your storage investment. You also have what you need to implement a program of departmental chargeback.

Using CommandCentral Storage together with other Symantec software, IT managers have the tools they need to perform real, active, end-to-end storage resource management and make strategic decisions about their future storage needs.

By actively managing the entire data path from application to array, CommandCentral Storage helps ensure optimal performance and availability of business critical applications. CommandCentral Storage also offers customizable policy-based management to automate notification, recovery, and other user-definable actions.

What's new in CommandCentral Storage 5.1

CommandCentral Storage 5.1 contains and builds upon CommandCentral Storage 5.0 functionality, providing several new features.

Management and discovery

CommandCentral Storage 5.1 introduces the following management and discovery features.

Enhanced agentless discovery of storage resources

If you do not install the CommandCentral managed host on hosts in your storage network, the CommandCentral Management Server can discover those hosts and their connections to storage resources through agentless discovery.

The process involves creating a user-created host in order to associate the unidentified adapter (HBA) discovered through switch discovery to the host to which it connects. In previous versions of CommandCentral, you could do this one host at a time. Now, CommandCentral 5.1 provides you with the ability to create multiple hosts at once and to automate the process by creating rules and importing information from a CSV file.

For more information about this feature, see the *CommandCentral Storage User's Guide*.

Detection of configuration related changes to storage arrays

In CommandCentral Storage 5.0 MP1, explorers initiate discovery of devices based on the explorer's polling interval. The polling interval is the amount of time that the explorer waits to initiate discovery of the device. For example, the polling interval might be 180 minutes.

In CommandCentral Storage 5.1, explorers continue to initiate discovery of devices based on the explorer's polling interval; however, for certain array explorers, you can also enable change detection. When you enable change detection, explorers listen to SNMP traps or frequently poll storage arrays—for example, every 15 minutes—in order to detect configuration related changes to that array—for example, masking changes. When the explorer detects configuration related changes to the storage array, the explorer initiates a full discovery of the array.

For example, if you enable change detection for EMC CLARiiON storage arrays, by default, the explorer listens for SNMP traps from CLARiiON storage arrays. When the explorer detects changes, it initiates discovery of the array. Because the explorer discovers the changes in near real-time, CommandCentral Storage can provide you with more up-to-date information about the storage array. In contrast, if you do not enable change detection, discovery occurs only when the

explorer polls the storage array using the polling interval—for example, a polling interval of 180 minutes.

Change detection is available for the following storage arrays:

- EMC CLARiiON
- EMC Symmetrix
- Hitachi HiCommand
- HP EVA
- NetApp unified storage devices

For information about enabling change detection, see the *CommandCentral Hardware and Software Configuration Guide*.

Improved Data Module file scanning

In CommandCentral Storage 5.0 MP1, the Data Module file scanner determines a file's size by its logical size. Now, in CommandCentral Storage 5.1, the file scanner also collects a file's physical size. A file's physical size provides you with a more accurate account of space consumption over the logical size. You can use the Data Module Importer settings and Data Module rules to specify whether you want summary reports that report on directory size, user consumption, file type usage, and aging data to display a file's size by its logical size or physical size. Additionally, you can drill down into detail reports to display both the logical size and physical size.

For more information, see the *CommandCentral Administrator's Guide*.

Discovery of device groups and composite groups for EMC Symmetrix storage arrays

CommandCentral Storage now discovers the name of the device groups and composite groups to which devices from EMC Symmetrix storage arrays belong. The group names appear when you view an EMC Symmetrix storage array's Devices pane.

Discovery of replication objects for HP EVA storage arrays

CommandCentral Storage now discovers the following replication objects for HP EVA storage arrays:

- Snapshots
- Vsnaps
- Snapclones

Added support for discovery of ESX servers through the VMware Infrastructure SDK

In CommandCentral Storage 5.1, you can now configure discovery of ESX servers through the VMware Infrastructure SDK (VI SDK). This allows you to discover individual ESX servers through VI SDK or a VirtualCenter that manages multiple ESX servers through VI SDK.

For information about configuring discovery through VI SDK, see the *CommandCentral Hardware and Software Configuration Guide*.

Sybase ASE 15 support

CommandCentral now supports discovery of Sybase Adaptive Server Enterprise (ASE) 15.

Added support for the correlation of non-HDS backend array volumes for HDS Tagma USP and USP-V series arrays

CommandCentral now supports the correlation of the physical disks of HDS Tagma USP and USP-V series arrays and their backend array volumes (LUNs) when the backend arrays are from other vendors that are listed in the *CommandCentral Hardware and Software Compatibility List*.

Added support for the correlation of backend array volumes for NetApp V-Series storage systems

CommandCentral now supports the correlation of the physical disks of NetApp V-Series storage systems and their backend array volumes (LUNs).

Reporting

CommandCentral Storage 5.1 introduces the following reporting features.

Added in-context performance reports for certain objects

When you use the Managing Summary section of the CommandCentral Storage Console to navigate to an object's Reporting pane, you can now select performance reports that are scoped for the following objects:

- Fibre channel adapters
- Fibre channel controllers
- LUNs
- Physical disks
- RAID groups for Hitachi HDS storage arrays
- Switch ports

- VxVM volumes

Added the Switch Port Usage Trend report

You can now view the Switch Port Usage Trend report, which allows you to track used and unused ports over a specified time frame.

New sample ad hoc reports

CommandCentral Storage now includes the following sample ad hoc reports:

- Application Access Path Inventory Report: Presents all the combinations of end-to-end access path inventory (for the logical objects) from application to the LUN (and the associated array).
- Fibre Attached Storage Consumption Report: Displays information about fibre attached storage given to hosts and how that capacity is utilized by the file systems.
- Local vs Remote Replication Report: Depicts how much of the primary (source) capacity is replicated locally vs replicated remotely.
- NetApp Quota Over-Provisioning Report: Provides details about quota allocation on a NetApp volume and the % over-provisioning.
- SAN Storage Report: Details array and host utilization of SAN storage and also the shared claimed capacity between hosts.

For information about working with these custom reports, see the *CommandCentral Storage User's Guide*.

Installation

CommandCentral Storage 5.1 introduces the following installation features.

New licensing options

In previous versions of CommandCentral Storage, you could purchase licenses to enable the following modules:

- Operations Module
- Data Module
- Operations Module and Data Module

In CommandCentral Storage 5.1, both the Operations Module and Data Module install by default. CommandCentral Storage now includes the following types of licenses:

- Management Server

- Managed host
- Switch port
- NAS (TB)

Because of these new licensing options, you need to obtain new licenses when you upgrade to CommandCentral 5.1. When you upgrade to 5.1, an evaluation license installs. The evaluation license is valid for 60 days. Obtain new licenses before the evaluation license expires.

For more information about obtaining new licenses, go to the Symantec Licensing Portal: www.symantec.com/business/products/licensing/activation/

For more information about CommandCentral licensing, refer to the *CommandCentral Administrator's Guide*.

Ability to install a managed host and then configure it later

In CommandCentral Storage 5.1, you can now choose to install the managed host without configuring it. You can then configure the host at a later time. For example, you might use this feature to clone the managed host on multiple hosts for a faster deployment.

For more information, see the *CommandCentral Installation Guide*.

Reduced media and install footprint for the managed host

Both the media footprint and installation footprint of the CommandCentral managed host was reduced. As a result, the managed host occupies less space.

Other enhancements

CommandCentral Storage 5.1 introduces the following features.

Windows Server 2008 support

You can now install the CommandCentral managed host and Push Install Utility on Windows Server 2008 hosts.

Red Hat Linux 5.0 support

You can now install the CommandCentral managed host on Red Hat Linux 5.0 hosts.

SUSE Linux Enterprise server 9 and 10 support

You can now install the CommandCentral managed host on SUSE Linux Enterprise server 9 and 10 hosts.

Added links to access the CommandCentral Storage Change Manager Console

If you enable CommandCentral Storage Change Manager on your Management Server, you can load the CommandCentral Storage Change Manager Console from the CommandCentral Storage Console. To do this, you can use the following links:

- Storage Change Manager—this link appears in the header of the CommandCentral Storage Console. When you click this link, the CommandCentral Storage Change Manager Console loads in a new browser window and the Home pane (Dashboard) displays.
- Change History—this link appears in the Overview pane for storage resources for which CommandCentral Storage Change Manager tracks the change history. When you click this link, the CommandCentral Storage Change Manager Console loads in a new browser window, displays the Changes pane, and filters the pane to display the change history for the specific storage resource.

For more information, see the *CommandCentral Storage User's Guide*.

Name of device managers display when viewing list of devices

When you view the list of configured devices in the Console, the Configured Devices Summary now displays the name of the device manager that manages your devices. This is helpful when you want to identify the device manager that manages a specific device. For example, you may want to identify the CIMOM that manages each of your storage arrays.

For more information, see the *CommandCentral Administrator's Guide*.

Ability to set new managed hosts in unmanaged state

In CommandCentral Storage 5.1, you can configure the Management Server to detect new managed hosts, but not automatically manage those hosts. When this happens, the Management Server does not collect any data from the managed host and it does not monitor the managed host. When you are ready for the Management Server to manage an unmanaged host, you can simply refresh the managed host in the Console.

For example, you might do this if you have a standard system image policy or if you need to take advantage of an available installation window.

For more information, see the *CommandCentral Administrator's Guide*.

Hotfix deployment mechanism

CommandCentral introduces a new hotfix deployment mechanism that allows you to push and install hotfixes on remote hosts. The mechanism also allows you to determine the current version of a CommandCentral component so that you can better manage the deployment of hotfixes.

For more information about the hotfix deployment mechanism, see the *CommandCentral Administrator's Guide*.

What you can do with CommandCentral Storage

Symantec strives to help you manage the integrity of your information by enabling you to maintain the right balance of information security and availability. Symantec delivers market-leading technology, insight, and expertise in the areas of information security, data management, systems management, storage management, and application performance management.

With Symantec's unmatched breadth and depth, your IT organization can better align with business objectives and address the issues of cost, complexity and compliance. Symantec is uniquely positioned to help keep your business up, running, and growing, no matter what happens.

CommandCentral Storage provides a single, centralized, consistent storage management console to simplify the complex tasks involved in deploying, provisioning, managing, and growing a multi-vendor networked storage environment.

Managing the storage network: introduction

Many organizations—as they adopt e-commerce, supply chain management, compliance, and other data-intensive applications—find that their data is exploding. More and more storage is needed to digitize manuals, corporate records, and other paper-based information, and to hold ever-increasing multimedia content.

If all that volume and complexity weren't enough of a management challenge, today's business environments demand that data be available immediately, continuously, and from anywhere—to multiple applications and to hundreds, thousands, or even millions of customers, business partners, and employees.

Storage network technologies

Historically, enterprises have relied heavily on parallel SCSI technology to provide the performance required for their enterprise data storage needs. More recently, however, some enterprises are finding that the restrictions imposed by SCSI architecture are too costly for SCSI to continue as a viable solution.

To overcome these restrictions, many enterprises have turned to a network-attached storage (NAS) model that enables storage arrays to reside directly on the main user network, where disk accesses may be made directly rather than through the server's network connection. However, this model can add a significant load to the network, which frequently is already starved for bandwidth.

Responding to this problem, some enterprises have implemented storage area networks (SANs) in which storage is placed on its own dedicated network. This dedicated network can improve efficiency and reliability by effectively separating traffic on the storage network from traffic on the main user network.

Storage virtualization

CommandCentral Storage is a valuable asset for enterprises that have implemented storage virtualization—the process of taking multiple physical storage devices and combining them into logical (virtual) storage devices that are allocated to applications and users at will.

Storage virtualization helps ease management by building a layer of abstraction above the physical storage; however, your administrators still need to penetrate that layer in order to view and manage the physical storage. CommandCentral Storage collects detailed information about how physical storage is apportioned and used, and it provides a graphical user interface for presenting the information to the administrator.

Although virtualization is not a new concept, CommandCentral Storage now enables you to take advantage of storage virtualization services over the entire storage network, across all types of storage hardware and server platforms. You also gain storage resource management capabilities such as hardware discovery, visualization, reporting, and a central administration point for your storage network.

Storage administrator requirements

Because both storage resources and IT personnel vary widely from enterprise to enterprise, the job of storage administrator is often filled by people with various skill sets and work backgrounds: mainframe operators, traditional network administrators, system administrators, and others in the IT industry.

In a utility computing environment, the storage administrator usually works closely with network administrators and others whose responsibilities range across the entire IT department. Nevertheless, the storage administrator needs to know details about how storage is apportioned and used on both the logical and physical levels. He or she is also responsible for providing overall guidance on how the storage network is used and on the direction it will take in the future.

Here are some examples of other tasks a storage administrator typically performs:

- Manage storage resources—for example allocating storage to hosts and the applications that run on them, and defining logical groups for easier management
- Test new vendors' hardware and integrate it into the storage network

- Generate reports about the network's physical resources and about storage usage
- Troubleshoot network elements
- Manage day-to-day performance and resource availability
- Develop a data protection strategy and assure that the storage network is secure

Meeting the needs of storage administrators with CommandCentral Storage

CommandCentral Storage can maximize the return on your investment in storage technology. It does so by providing tools designed to help the storage administrator optimize the operation of your storage network.

Discovery of storage resources

CommandCentral Storage contains in-band and out-of-band discovery methods for discovering a wide range of network or storage network objects. As a result, you can discover and monitor physical and virtual fabrics, hosts, groups, storage devices (such as arrays and NetApp unified storage devices), and applications.

Versatile displays of information about storage resources

The CommandCentral Storage Console provides a rich, versatile set of graphical and textual displays with which you can visualize physical resources—such as hosts and arrays—and logical resources—such as virtual fabrics—as well as the connections and interrelationships between them. Displays also include storage usage reports and projected storage consumption trends.

Policies for managing resources

Using the CommandCentral Storage Alert Manager, you can define and manage policies that are associated with objects in your storage network. A policy consists of a condition to monitor, such as heavy traffic on a specific switch port, and a set of actions to take when that condition is met. In addition to the policies you define, an extensive set of default policies is included with the CommandCentral Storage product.

Data collection

CommandCentral Storage includes a versatile set of collectors that gather information about network resources for evaluation by the Alert Manager. CommandCentral Storage collects information about capacity, environmental conditions (such as temperature), performance, traffic, errors, and object availability.

Storage provisioning

Using tools provided in CommandCentral Storage, a storage administrator can allocate storage resources to specific hosts and applications and control access to storage resources. You can also create LUNs from unconfigured storage. Another feature allows provisioning jobs to be scheduled for times when the network is less busy.

Through the use of storage accounts, a senior administrator can establish provisioning guidelines, or policies, that regulate the actions of lower-level administrators.

Graphical reports about network resources, performance, and events

CommandCentral Storage includes an extensive set of graphical reports with which you can display collected data about resources, performance, history, and changes on your storage network. You can also create custom reports tailored to your own needs. By enabling you to monitor things like trends in storage usage, these reports can help you use your storage assets more efficiently.

About Veritas CommandCentral Storage Change Manager

Veritas CommandCentral™ Storage Change Manager by Symantec provides enterprise–wide insight into storage infrastructure–related changes in your data center. With this insight, you can maximize storage availability and minimize downtime due to planned and unplanned changes.

CommandCentral Storage Change Manager includes the following capabilities:

- Discovers the storage resources in your data center. This allows storage administrators to monitor your storage infrastructure.
- Detects changes made to your storage resources. This allows storage administrators to monitor changes and assess the impact those changes have on your storage infrastructure.
- Assesses the changes to storage resources against custom policies and best practice policies. With custom policies, storage administrators can define connectivity, configuration, and compliance requirements for your storage assets. Best practice policies monitor your storage assets using industry–recognized best practices for storage management.
- Notifies you of changes to storage resources that violate your custom policies. This allows storage administrators to correct changes that can potentially disrupt your storage infrastructure.

- Identifies potential risks to your storage infrastructure based on best practice policies. With risks, storage administrators can identify the impacted storage resources and take the necessary action to remove the risk from your storage infrastructure.
- Lets you view reports that provide an enterprise–wide view of the changes that occur in your data center.

Use CommandCentral Storage Change Manager as your enterprise solution for storage change and configuration management to ensure the availability of your storage infrastructure, manage service level agreements more effectively, and improve operational efficiency.

What you can do with CommandCentral Storage Change Manager

Storage administrators can use CommandCentral Storage Change Manager to monitor and manage changes to the storage infrastructure. With CommandCentral Storage Change Manager, you can do the following:

- Monitor your storage resources and view detailed information about them. For example, you can view storage arrays and the LUNs that reside inside each array.
- Track changes to your storage resources. For example, you can view information about an application that was added to a host.
- Create custom policies. With custom policies, you can define the connectivity, configuration, and compliance requirements for your storage resources. Additionally, you can also define who should receive notifications of violations to the policy and you can define the target resolution time for violations.
- Monitor violations against your custom policies. When a violation occurs, you can view the violation to determine the impacted storage resources, find the change that caused the violation, and take the necessary actions to resolve the violation.
- Use best practice policies. These policies ship with CommandCentral Storage Change Manager and monitor storage changes against industry recognized best practices for storage management. For example, one best practice policy monitors clusters that host a service group to ensure that the cluster's nodes have access to the same set of LUNs.
- Monitor the risks that best practice policies identify. Similar to violations, CommandCentral Storage Change Manager generates a risk if a change breaches a best practice policy. You can view a description of each risk to identify impacted storage resources and then take the necessary action to resolve the risk.

- View reports that provide an enterprise–wide view of the changes made to your storage resources, a summary of the hosts and applications that have policies applied to them, and details about violations, including the time that it takes to resolve violations and the type of violations that have generated.
- Display an overall view of the current state of your data center. With the Dashboard, you can view graphs that detail the number of recent violations and changes. This allows you to identify current impacts and helps you to visualize storage change trends in your data center.

How CommandCentral Storage Change Manager works

The CommandCentral Storage Change Manager Management Server and managed hosts discover storage resources in your data center. When changes occur to those resources, CommandCentral Storage Change Manager detects and aggregates the changes. During the detection process, CommandCentral Storage Change Manager assesses the changes against custom policies and best practice policies. If a change violates a custom policy, CommandCentral Storage Change Manager generates a violation. If a change violates a best practice policy, CommandCentral Storage Change Manager generates a risk.

CommandCentral Storage Change Manager allows you to interact with the storage objects it discovers, the changes it detects, and the violations it generates through its Console. You can also use the Console to manage custom policies and best practice policies, configure devices, view reports, and manage user accounts.

About Veritas CommandCentral Enterprise Reporter

Veritas CommandCentral Enterprise Reporter by Symantec (Enterprise Reporter) improves storage service management by aligning IT to business objectives. Enterprise Reporter provides the following to business information executives and storage administrators alike:

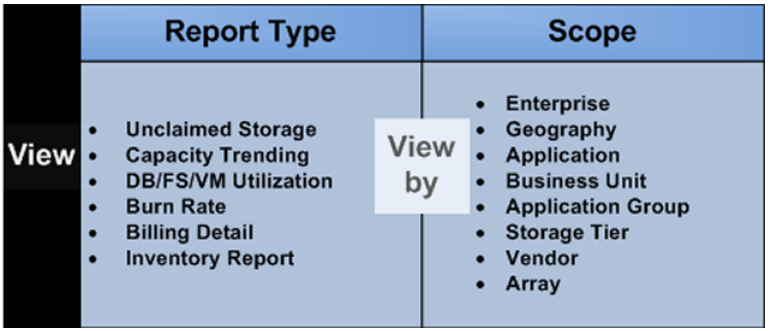
- Global views of storage assets mapped to your organization
- Business insights into inventory utilization
- On-demand customized reporting
- Personalized dashboards for multiple users

Enterprise Reporter provides a central reporting interface for your storage infrastructure by unifying information from multiple data centers and categorizing it along lines of the business. If you are a business information executive, you can use Enterprise Reporter to view your storage environment at the enterprise level. You can then drill down into your organization's hierarchy, which could be

organized by location, departments, or any other logical business unit. This summarized information enables you to assess trends in your storage environment, which you can then analyze to assign responsibility.

If you are a storage administrator, you can use Enterprise Reporter to identify capacity trends, review storage inventory, and determine how much storage costs per business unit. With this information in hand, you can promote storage accountability and drive down costs.

Figure 1-1 Report types and scopes



Use Enterprise Reporter to answer questions like:

- Which applications are growing out of control?
- What will my tier 1 storage growth look like in 2008?
- How is capacity trending in North America versus Europe?
- How is storage allocated in the finance department?
- Which department is taking up the most percentage of tier 1 storage in the Toronto data center?

Storage administrators and business users operate Enterprise Reporter with CommandCentral Storage. Where CommandCentral Storage provides storage reporting for a single data center and is used at an operational level, Enterprise Reporter allows you to aggregate storage information from multiple data centers and view storage assets by a variety of business dimensions. For example, if you are a business information executive, you could use Enterprise Reporter to identify the trend of unclaimed tier 1 storage in your New York and Zurich data centers. You could then ask the storage administrators at each site to use CommandCentral Storage to drill down to the details of which arrays or LUNs are unclaimed.

What's new in CommandCentral Enterprise Reporter 5.0 MP1

CommandCentral Enterprise Reporter 5.0 MP1 contains and builds upon previous Enterprise Reporter functionality, providing several new features.

- Data rollup enhancements
- Storage tier rule builder enhancements
- Reporting enhancements
- Security enhancements

Data rollup enhancements

Enterprise Reporter 5.0 MP1 includes enhanced data rollup features.

For more information about data rollup, see the *CommandCentral Enterprise Reporter Administrator's Guide*.

Inclusion of NetApp unified storage device data

Enterprise Reporter now rolls up information about NetApp unified storage devices in your data centers. Depending on the versions of your CommandCentral Storage data sources, all or most of the following information about your NetApp unified storage devices is available for you to report on: Multistore Virtual Systems, volumes, qtrees, and shares.

You cannot roll up NetApp data from CommandCentral Storage 4.3 Management Servers.

See the *CommandCentral Enterprise Reporter Administrator's Guide* for more information about the types of NetApp data that you can report on with each 5.x version of CommandCentral Storage.

Inclusion of custom storage object attributes

When you perform data rollup from your CommandCentral Storage data sources, you can now choose to include custom, user-created storage object attributes that your storage administrators may have implemented within CommandCentral Storage.

Examples of custom attributes that your storage administrators may define within CommandCentral Storage include:

- Physical location of a storage array
- Warranty date for switches and storage arrays
- Date of purchase

You can now use these custom attributes in Enterprise Reporter reports. In Query Studio, they appear in the list of storage object views with the prefix of "Custom Attribute." For example, to see custom attributes in the Switch Analysis package in Query Studio, select Switch Analysis Views > by Switch Attributes > Switch.

Data source preparation enhancements

To prepare CommandCentral Storage data sources for data rollup in Enterprise Reporter 5.0, you needed to run scripts that added users and updated the data sources database schema. With Enterprise Reporter 5.0 MP1, you no longer need to run these scripts. Instead, when you add a new data source, Enterprise Reporter automatically prepares the data source before adding it.

Data rollup view enhancements

Enterprise Reporter 5.0 MP1 includes enhanced Data Rollup Configuration views that improve usability and efficiency. For example, if you enter the fully qualified host name or IP address of the database server host when you add a data source, Enterprise Reporter fills in related data source information. Additionally, fields that were not integral to the process of setting up a data source were removed from these views.

Storage tier rule builder enhancements

In addition to the Advanced Rule Builder, Enterprise Reporter 5.0 MP1 now includes a Basic Rule Builder. Both of these tools help you create rules that govern the assignment of storage to specific storage tiers, but the Basic Rule Builder lessens the complexity of creating and modifying rules. For example, in the Basic Rule Builder, you no longer have to type complex SQL statements. The Advanced Rule Builder remains in Enterprise Reporter.

For more information about these tools and storage tier rules, see the *CommandCentral Enterprise Reporter Administrator's Guide*.

Reporting enhancements

Enterprise Reporter includes the following reporting enhancements.

Sample reports

Enterprise Reporter now includes the following sample reports that are related to NetApp unified storage devices:

- NetApp Filers
- NetApp QTrees
- NetApp Shares

- NetApp Volumes

Dashboard customization with selected reports

By default, the Dashboard shows report categories and their descriptions. With Enterprise Reporter 5.0 MP1, you can customize the Dashboard to show any report, including one that you created. Enterprise Reporter provides a new "Set This as Home Report" option that enables you to display a selected report on the Dashboard.

For more information about the Dashboard, see the *CommandCentral Enterprise Reporter User's Guide*.

New package and metrics

Enterprise Reporter 5.0 MP1 now includes the following additions, which expand the storage asset data that you can report on:

- The new Storage Analysis package includes the metrics from the 5.0 Array Analysis package as well as additional metrics. We recommend that you use this new package instead of the Array Analysis package that shipped with 5.0. The Storage Analysis package includes the following metrics:
  - Storage capacity metrics, which are equivalent to the Array Analysis package metrics.
  - SAN and DAS storage metrics, which are equivalent to the allocated storage metrics in the Array Analysis package (located in Array Analysis > Configured Capacity Metrics > Allocated Storage Metrics).
  - NAS Storage metrics, which include NAS volume capacity data and NAS inventory data for volumes, qtrees, volumes, shares, folders, files, and users.
- The new NetApp package includes NetApp data about unified storage devices, such as Multistore Virtual Systems, volumes, qtrees, and shares.
- A new metric, Drive Type, was added to the following packages:
  - Host Storage Allocation package
  - Tiered Storage Allocation package

The Drive Type metric indicates the physical disk drive that is used for creation of the LUN. Values include Fibre Channel, ATA, and Unknown.

For more information about packages and metrics, see the *CommandCentral Enterprise Reporter User's Guide*.

Security enhancements

Enterprise Reporter includes additional security features.

SSL mode

Cognos now runs in SSL mode, enabling enhanced security.

User permission enhancements

Enterprise Reporter now restricts actions based on the following user permissions:

- Administrator
- Read-write
- Read-only

For more information about restricting actions based on user permissions, see the *CommandCentral Enterprise Reporter Administrator's Guide*.

Report access enhancements

You can prevent user types from reading, modifying, or running specific reports. You might want to prevent users from executing a report to display a specific set of data and not retrieve current report data.

For more information about limiting access to specific reports, see the *CommandCentral Enterprise Reporter User's Guide*.

What you can do with CommandCentral Enterprise Reporter

Enterprise Reporter includes a global view of storage with the ability to roll up information from multiple data centers into a single comprehensive view—organized by lines of business, geography, application, or other customized views. It can help compare trends across continents, find the application consuming the most storage in a particular data center, or locate the business unit consuming more than its fair share of storage.

Storage administrators can use Enterprise Reporter along with CommandCentral Storage. While CommandCentral Storage provides an operational view of storage data primarily for storage administrators, Enterprise Reporter summarizes this data across data centers and integrates business information, allowing for a global view for CIOs, directors, and business unit leaders.

For example, business leaders use Enterprise Reporter to identify storage trends (such as an alarming regional growth rate of tier 1 storage). Then, administrators use CommandCentral Storage to help ensure that the appropriate storage service is being delivered to the business.

Business executives and storage administrators can use Enterprise Reporter to do the following:

- Develop highly customizable business views of data from multiple data sources. For example, administrators can discover global storage usage trends and drill down to identify high consumers across geographic or business units.
- Create storage tiers that match business needs and associate costs with each tier. Administrators can then identify where storage is allocated appropriately to costly tiers.
- Create ad hoc reports quickly by inserting data fields (such as host attributes, array attributes, allocated capacity, and claimed capacity) into a report table. Add selectable and customizable filters to narrow the focus or display data visually using charts for quick interpretation. To focus on specific business units, users can drag customized business view options into the report, easily grouping data into business units.
- Create advanced reports incorporating more advanced layout options, such as maps, images, and HTML. Also, add multiple queries to reports or insert prompts that request report users to select the report focus that they want prior to running the report.
- Automate report generation with a specified schedule and set automated distribution through email.
- Develop a personalized dashboard in Cognos Connection containing customized reports that display answers you need quickly.
- Select a sample report or report you created as the default report for the Enterprise Reporter Dashboard.

How CommandCentral Enterprise Reporter works

Multiple data centers, each with one or more CommandCentral Storage Management Servers, send data to Kettle, which performs extract, transform, and load (ETL) processes. Kettle aggregates the data and prepares it for use by the Oracle database. Kettle then loads the data into the Oracle database.

The Oracle database, an enterprise-scalable database, stores the data and passes it to Cognos. Cognos enables users to select data, filters, and business views to develop customized reports. Administrators and analysts use Cognos Connection, Query Studio, and Report Studio to create personalized dashboards and design reports.

Enterprise Reporter enables users to see the aggregated data in customizable reports via its Console. Administrators also use the Console to configure data rollup, storage tiers, business views, and user accounts.

Getting CommandCentral up and running

To get CommandCentral up and running, review information about planning tips, system requirements, and the installation process. The following topics provide more information:

- Planning tips for installation, configuration, and deployment of CommandCentral
- System requirements for CommandCentral
- Installation overview

Planning tips for installation, configuration, and deployment of CommandCentral

To plan your installation of the CommandCentral modules, do the following:

- Select the hosts on which you will install the Management Server
- Select the hosts on which you will install managed hosts
- Configure network devices for discovery and management
- Prepare your Oracle database (Enterprise Reporter only)
- Consider how you will implement the Symantec Product Authentication Service

Review a complete set of planning considerations in the following documents:

- For CommandCentral Storage and CommandCentral Storage Change Manager, refer to the *CommandCentral Installation Guide*.
- For Enterprise Reporter, refer to the *CommandCentral Enterprise Reporter Installation Guide*.

System requirements for CommandCentral

To help plan your installation, review information about operating system requirements and Web browser support.

Supported operating systems for CommandCentral

The CommandCentral modules are supported in a variety of popular operating environments.

Table 1-1 identifies the supported operating systems for CommandCentral components.

Table 1-1 Supported operating systems for CommandCentral components

Component	Operating systems supported
CommandCentral Storage Management Server	Solaris and Windows
CommandCentral Storage Change Manager Management Server	Solaris and Windows
Enterprise Reporter Management Server	Solaris
CommandCentral managed host	Solaris, Windows, Red Hat Linux, SUSE Linux, AIX, and HP-UX.

For information about which versions of each operating system is supported, refer to the following:

- *CommandCentral Storage Release Notes*
- *CommandCentral Storage Change Manager Release Notes*
- *CommandCentral Enterprise Reporter Release Notes*

Web browser support for the CommandCentral Console

You can log in to the CommandCentral Console using the following Web browsers:

- Microsoft Internet Explorer (Windows only)
- Mozilla (Solaris only)
- Mozilla Firefox (Windows only)

For information about which versions of each browser is supported, refer to the following:

- *CommandCentral Storage Release Notes*
- *CommandCentral Storage Change Manager Release Notes*
- *CommandCentral Enterprise Reporter Release Notes*

Installation overview

To install CommandCentral, you need to do the following:

- Review installation prerequisites

- Mount the product disc
- Run the product installer
- Perform post-installation setup

For more information about the installation process refer to the following:

- For CommandCentral Storage and CommandCentral Storage Change Manager, refer to the *CommandCentral Installation Guide*.
- For CommandCentral Enterprise Reporter, refer to the *CommandCentral Enterprise Reporter Installation Guide*.

Where to find more information about CommandCentral

Use the following topics to find more information about CommandCentral:

- CommandCentral on the Web
- Getting help
- About CommandCentral documentation
- Commenting on product documentation

CommandCentral on the Web

For comprehensive, up-to-date information about CommandCentral, visit the Symantec Web site:

http://www.symantec.com/Products/enterprise?c=prodinfo&refId=19

Getting help

If an issue arises while you are using CommandCentral, use the following information to pinpoint the problem and, if necessary, report it to Symantec.

For technical assistance, visit the following Web site:

http://www.symantec.com/enterprise/support/assistance_care.jsp

and select phone or email support. This site also provides access to resources such as TechNotes, product alerts, software downloads, hardware compatibility lists, and the Symantec customer email notification service. Use the Knowledge Base Search feature to access additional product information, including current and past releases of product documentation.

Diagnostic tools are also available to assist in troubleshooting problems associated with the product. These tools can be downloaded from the Symantec FTP site.

The following troubleshooting tools are available specifically for use with CommandCentral Storage:

- Run the `getinfo` script (on UNIX)
- Point to the Serverport and gather data using a browser (on Windows)

For license information, software updates and sales contacts, visit the following Web site:

https://licensing.symantec.com

About CommandCentral documentation

For information about CommandCentral product documentation, refer to the following:

- About CommandCentral Storage documentation
- About CommandCentral Storage Change Manager documentation
- About CommandCentral Enterprise Reporter documentation

About CommandCentral Storage documentation

The following guides provide information about CommandCentral Storage:

CommandCentral Administrator's Guide	Provides information about administering the product—for example, managing licenses and user accounts, configuring product components, and working with diagnostic information.
CommandCentral Getting Started Guide	Provides a high level overview of how you can use CommandCentral Storage.
CommandCentral Hardware and Software Configuration Guide	Provides setup requirements for applications and devices and instructs you how to configure CommandCentral Storage to discover them.
CommandCentral Hardware and Software Compatibility List	Lists the devices and applications that CommandCentral Storage supports.
CommandCentral Installation Guide	Instructs you how to install CommandCentral Storage.
CommandCentral Storage Migration Guide	Instructs you how to upgrade 4.x managed hosts to 5.x.

CommandCentral Storage Release Notes	Provides information about supported operating systems, host resource requirements, software limitations, and known issues.
CommandCentral Storage User's Guide	Describes how you can use CommandCentral Storage to monitor, manage, and report on your storage infrastructure.
CommandCentral Third-Party License Agreements	Provides information about third-party software that is used in CommandCentral Storage.

Product documentation is available on the Symantec Technical Support web site:

http://www.symantec.com/enterprise/support/documentation.jsp?pid=50379

About CommandCentral Storage Change Manager documentation

The following guides provide information about CommandCentral Storage Change Manager:

CommandCentral Administrator's Guide	Provides information about administering the product—for example, managing licenses and user accounts, configuring product components, and working with diagnostic information.
CommandCentral Getting Started Guide	Provides a high level overview of how you can use CommandCentral Storage Change Manager.
CommandCentral Hardware and Software Configuration Guide	Provides setup requirements for applications and devices and instructs you how to configure CommandCentral Storage Change Manager to discover them.
CommandCentral Hardware and Software Compatibility List	Lists the devices and applications that CommandCentral Storage Change Manager supports.
CommandCentral Installation Guide	Instructs you how to install CommandCentral Storage Change Manager.
CommandCentral Storage Change Manager Release Notes	Provides information about supported operating systems, host resource requirements, software limitations, and known issues.

CommandCentral Storage Change Manager User's Guide	Describes how you can use CommandCentral Storage Change Manager to view your storage resources, view detailed descriptions about changes to those storage resources, set up policies, and view violations to those policies.
CommandCentral Third-Party License Agreements	Provides information about third-party software that is used in CommandCentral Storage and CommandCentral Storage Change Manager.

Product documentation is available on the Symantec Technical Support web site:

www.symantec.com/enterprise/support/documentation.jsp?pid=54974

About CommandCentral Enterprise Reporter documentation

The following guides provide information about Enterprise Reporter:

CommandCentral Enterprise Reporter Administrator's Guide	Provides information about managing your data—for example, rolling up data from CommandCentral Storage and managing storage tiers, business views, and custom attributes. The guide also includes information about managing licenses and user accounts.
CommandCentral Getting Started Guide	Provides a high level overview of how you can use Enterprise Reporter.
CommandCentral Enterprise Reporter Installation Guide	Instructs you how to install Enterprise Reporter.
CommandCentral Enterprise Reporter Release Notes	Provides information about supported operating systems, host resource requirements, software limitations, and known issues.
CommandCentral Enterprise Reporter User's Guide	Describes how you can use Enterprise Reporter to create and manage reports.
CommandCentral Enterprise Reporter Third-Party License Agreements	Provides information about third-party software that is used in Enterprise Reporter.

Product documentation is available on the Symantec Technical Support web site:

www.symantec.com/enterprise/support/documentation.jsp?pid=54971

Commenting on product documentation

Submit comments about the product documentation to the following email address:

storage_management_docs@symantec.com

Please include the following information with your documentation comments:

- The title and product version of the guide you are commenting on
- The topic (if relevant) you are commenting on
- Your comment
- Your name

Glossary

access group See array virtual port.

active zone set The zone set that is currently enforced on a Fibre Channel fabric. Only one zone set can be active for a fabric at a given time. See also zone set.

addressable storage See LUN storage.

addressable unit Any storage resource in the network that is ready to be allocated for use by hosts and applications. Also called AddrUnit or AU. See also LUN.

Agent See managed host

aggregate A manageable unit of RAID-protected storage in a NetApp unified storage device, consisting of one or two plexes and containing one traditional volume or multiple FlexVol volumes. See also volume.

Alarm Service See CommandCentral Storage Alarm Service.

alert One of several types of configurable notifications produced when a CommandCentral Storage Alert Manager alarm is triggered. Every alert in CommandCentral Storage is dynamic, resetting itself automatically when a condition monitored by a policy returns to its specified CLEAR state.

Alert Manager See CommandCentral Storage Alert Manager

allocated storage The total amount of addressable storage in LUNs that is designated for use by specific hosts. A LUN is considered allocated when a host operating system has written a device handle for the LUN (in other words, claimed the LUN) or when the array has masked the LUN to a specific target. Contrast with unallocated storage.

application A program or group of programs designed to perform a specific task. Oracle Database and Veritas NetBackup are examples of applications.

arbitrated loop A topology for Fibre Channel networks in which nodes are connected in a single logical loop or ring created by tying the transmit lead of one node loop port to the receive lead of its downstream neighbor. There are primarily two types of arbitrated loops—public loops and private loops. A public loop is attached to a SAN fabric. A private loop is a free-standing arbitrated loop with no SAN attachment.

array See storage array.

array host group See array virtual port.

array virtual port A logical—or, as it is commonly called, "virtual"—port defined for some array types that support SMI-S 1.0.2 and earlier. When an array virtual port (or AVP) is defined, the array can support LUN masking with multiple, heterogeneous hosts through a single physical array port. Depending on the array vendor, array virtual ports may also be known as host storage domains, array host groups, access groups, and affinity groups. See also storage view.

attribute A property of an object that describes something about the object—such as its World Wide Name. The number and kind of attributes displayed for a resource depend on what type of object it is.

Audit Log A text file that contains a list of all changes made to the Hardware Abstraction Layer—such as devices added and removed—and to the CommandCentral Storage Alert Manager—such as modifications to policy and alert notification and changes to configuration settings.

Authentication Service See Symantec Product Authentication Service.

Authorization Service See Symantec Product Authorization Service.

available storage Configured storage that has not yet been apportioned into addressable units (LUNs). This storage is typically part of RAID groups. Contrast with LUN storage.

BCV (business continuance volume) An area of virtual storage that maps to a LUN on an EMC Symmetrix or DMX array and provides redundancy. Each BCV contains a copy of a standard device (STD).

binding See LUN binding.

bridge A device that connects and passes packets between two segments of a storage network that use the same communications protocol. See also router.

broadcast address An IP address specified for discovering hosts running the Hardware Abstraction Layer (both Management Servers and managed hosts) within a subnet. 255.255.255.255 is a special IP address that CommandCentral Storage can use to search for hosts within a subnet without crossing a subnet boundary.

bundle A logical grouping consisting of up to 16 physical links. CommandCentral Storage can discover, act upon, and display information about a bundle as if it were a single link. Also called port bundle.

capacity The amount of storage an object can allocate or use.

ccconfig See Command Central Configuration Utility.

circuit breaker A function in the Veritas Alert Manager that automatically limits the number of notifications sent to a recipient within a specified time.

claimed storage Storage for which at least one host's operating system has created a device handle. Contrast with unclaimed storage.

CLARiiON storage group In an EMC CLARiiON storage array, a set of addressable units (LUNs) defined so that an operator can perform one LUN masking operation for the entire set of LUNs rather than separately for each LUN. Contrast with storage group.

cluster A set of hosts (each termed a node) that share a set of disks and are connected by a set of redundant heartbeat networks. A cluster can have from one to 32 member systems, or nodes. Also called VCS cluster. Specific to virtualization, one or more virtualization servers.

cluster communication Communication between clusters using either of the two core communication protocols defined by Veritas Cluster Server: GAB and LLT. The communication takes place by means of heartbeat signals sent between systems or fast kernel-to-kernel broadcasts.

collector A measurement representing a specific state or numerical value for objects in the storage network. The Alarm Service uses collectors to monitor and correlate status and performance information, using several different processes. The Alert Manager uses information gathered by collectors to trigger policy actions such as SMTP mail, console alerts, commands, and logging. See also policy.

Command Central Configuration Utility A program, used in earlier releases of the SANPoint Control and CommandCentral Storage products, that scanned the storage network in order to identify potential configuration problems before installation. The program is no longer supported.

CommandCentral Storage A product offering designed to maximize the return on an enterprise's storage technology investment by providing tools with which a storage administrator can make the storage network or SAN operate as effectively as possible.

CommandCentral Storage Agent Push Install Utility A Windows-based utility with which you can install an agent that enables the collection of data through a variety of explorers. Using the Agent Push Install Utility, you can manage installs, upgrades, and uninstalls for multiple Windows-based managed hosts from one central location.

CommandCentral Storage Alarm Service A Server component (Windows service/UNIX daemon) that retrieves and correlates SNMP and other data and sends alerts to the CommandCentral Storage Alert Manager for further processing using defined policies. The Alarm Service has a command-line interface—`vxascmd`—with which you can connect to an Alarm Service server to obtain server and object information and perform various Alarm Service commands and queries.

CommandCentral Storage Alert Manager A Server component that manages policies associated with objects on the storage network. A policy associates certain sets of conditions with storage resources and defines actions to be taken when these conditions are detected. The Alert Manager is seamlessly integrated with the CommandCentral Storage product so that Console users can monitor, define, and modify policies.

CommandCentral Storage Console A graphical user interface that displays reports and other information for users of the CommandCentral Storage product through a standard Web browser. The

	Console provides a central point to display and manage storage resources, create and modify policies, provision storage, administer access control, and view reports.
CommandCentral Storage database	A database, residing on the Management Server, that gathers data related to performance and monitoring, reports, alarms, service requests, and the Hardware Abstraction Layer (HAL). A Sybase ASA (Adaptive Server Anywhere) database management system, the database is installed silently when you install CommandCentral Storage.
CommandCentral Storage Management Server	The portion of the CommandCentral Storage product offering that resides on the primary host. It contains components such as the primary Hardware Abstraction Layer, CommandCentral Storage database, web engine, and Alert Manager, Alarm Service, and Data Module Importer.
CommandCentral Storage Web Engine	The software component that supplies the data seen by users of CommandCentral Storage. The Web Engine receives data from one or more Servers and delivers the data to users through a standard Web browser.
configured storage	Physical storage that has been formatted and is ready to be apportioned into RAID groups. Contrast with unconfigured storage.
Console	See CommandCentral Storage Console.
DM (Data Module)	The Data Module is a subsystem of CommandCentral products that provides Microsoft Exchange and file scanning details.
DM (Data Module) Importer	A utility in CommandCentral Storage that parses data from the Data Module Exchange explorer and the Data Module File Systems explorer and places it into the CommandCentral Storage database. The DM Importer normally runs automatically, but a user can manually start it using the Console.
DM (Data Module) rules	User-configurable conditional statements that govern the behavior of the Data Module Exchange explorer and the Data Module File Systems explorer. (These explorers are part of the Data Module in CommandCentral Storage.) For each explorer, the rules control the scope of its discovery and the ways it gathers and logs data.
data store	See CommandCentral Storage database.
delete	In CommandCentral Storage, an operation that removes discovery information about one or more objects from the CommandCentral Storage database. The states of the objects themselves—for example, the existence of a LUN on an array or the configuration of a switch—are not affected by the delete operation. Optionally, deleted information can be restored to the database by a rediscover operation. Contrast with destroy. See also rediscover.
destroy	In CommandCentral Storage, an operation that modifies the configuration of one or more devices in the SAN. Examples are destroying zones and destroying port bundles, both of which modify the configuration of one or more switches. Unlike

	deleted objects, destroyed objects cannot be restored to the CommandCentral Storage database by a rediscover operation. Contrast with delete.
device	A collective term for disks, tapes, disk arrays, tape arrays, and any other objects that store data. Also storage device.
device handle	The name the operating system uses to identify a storage resource (known as an addressable unit or LUN), and the correct means (driver, system call) to access it. Also OS handle.
discovery	The process of finding objects on the storage network and adding information about them to a database. In CommandCentral Storage, most discovery is done by the Hardware Abstraction Layer, which stores information about storage resources in the CommandCentral Storage database. Discovery of storage arrays is performed by the Veritas Array Integration Layer (VAIL). See also explorer and extended discovery.
discovery data store	In CommandCentral Storage version 4.x, the cached database containing the names and attributes of all objects discovered and maintained by the SAN Access Layer (SAL). In version 5.x, the discovery data store no longer exists. Discovery data is stored in the CommandCentral Storage database.
disk array	A collection of disks controlled and managed through firmware. See also storage array.
disk device	A rewriteable, randomly addressable data storage device.
disk group	A collection of disks that share a common configuration. A disk group configuration is a set of records containing detailed information on existing Veritas Volume Manager objects (such as disk and volume attributes) and their relationships. Each disk group has an administrator-assigned name and an internally defined unique ID. The root disk group (rootdg) is a special private disk group that always exists.
File Scanning explorer	Any one of several explorers in CommandCentral Storage that gathers data by scanning data on in host file systems. See also DM (Data Module) Importer.
DMP (Dynamic Multipathing)	A feature of Veritas Volume Manager that provides greater reliability and better performance by using path failover and load balancing for multiported disk arrays connected to host systems through multiple paths. DMP detects the various paths to a disk using a mechanism that is specific to each supported array type. DMP can also differentiate between different enclosures of a supported array type that are connected to the same host system.
enclosure	In CommandCentral Storage, a method for visually grouping objects in the Console's Managing Summary pane or Topology Map. For example, a user might choose to represent a JBOD visually as an enclosure instead of as one or more separate disks.

event A notification that indicates when an action, such as an alert or a change in state, has occurred for one or more objects on the storage network.

explorer A software tool that uses a unique methodology to discover information about a particular kind of resource on the storage network. The CommandCentral Storage product includes several explorers that are used to locate resources and discover information about them. See also discovery.

extended discovery A CommandCentral Storage feature that enables discovery of all LUNs and Fibre Channel ports in a storage device along with additional LUN attributes. Extended discovery is activated when you install the product with the array management feature. See also discovery.

extent A continuous space on a disk or storage volume that is occupied by or reserved for a particular data set, data space, or file.

extent pool In an IBM DS6000 or DS8000 array, a storage virtualization object that aggregates the extents from a set of ranks. See also extent rank.

fabric A group of SAN objects connected by a Fibre Channel (FC) switch. A fabric contains at least one FC switch and may also contain zones.

failover A backup operation that automatically switches to a standby database, server, or network if the primary system fails or is temporarily shut down for servicing.

FC-GS-3 Fibre Channel third-generation generic services. An ANSI (American National Standards Institute) standard that defines commonly-used Fibre Channel services such as the name server, management server, and time server. In CommandCentral Storage, this standard is used for the GS explorer to discover Brocade switches. See also Fibre Channel GS explorer.

Fibre Channel A collective name for the fibre optic technology that is commonly used to set up a storage area network (SAN) or virtual fabric (VSAN). A set of standards capable of transferring data between ports and through network devices at higher speeds and over significantly greater distances than SCSI technology, Fibre Channel supports point-to-point, loop, and fabric topologies.

file system A means of organizing the addressable (LUN) storage of one or more physical or virtual disks to give users and applications a convenient way of organizing files. File systems appear to users and applications as directories arranged in a hierarchy.

filter In CommandCentral Storage, a feature in tables and in the Topology Map with which a user can limit the number and types of objects displayed. Also, a way in which an administrator can limit the amount of data collected by the Exchange explorer during an Exchange scan.

firmware A set of software instructions set permanently in a device's memory.

GBIC	Gigabit interface converter. A widely used transceiver module for Fibre Channel. A GBIC is modular and hot-swappable and can be either copper or optical.
generic device	A disk or tape device. When generic storage devices are visible to a host running the Hardware Abstraction Layer (HAL), the CommandCentral Storage Console displays the correct object type.
generic group	A user-defined collection of switches, hosts, and storage devices. The Group Builder tool is used to create and modify generic groups. See also group, object dependency group.
group	A class or collection of storage objects. Groups are useful for a number of different purposes, for example scoping reports and views to encompass a set of objects with similar attributes. CommandCentral Storage supports two types of groups: generic groups, which are defined by users, and object dependency groups, which are defined automatically to track volumes and file systems having dependencies on specific applications.
GS explorer	An explorer that uses the Fibre Channel Common Transport (CT) protocol to discover switches in-band over Fibre Channel, obtain switch characteristics, and explore port connectivity. Prior to CommandCentral Storage version 5.x, the GS explorer was known as the MGEX explorer.
guest operating system	An operating system that is installed on a virtual machine. See also managed virtual host.
hard zoning	A fabric zoning method in which a Fibre Channel switch actively blocks access to zone members from any objects outside the zone. Because the active blocking takes place at the level of ports on the switch, hard zoning is also referred to as switch port zoning. In hard zoning, each switch uses a routing table to determine whether data is allowed to flow across a connection. See also soft zoning.
HAL (hardware abstraction layer)	A component that performs device discovery and management for storage applications and devices. HAL maintains a real-time topology of the storage network and interacts directly with switches and storage arrays to control access to storage resources. HAL extends the functionality offered in previous releases of CommandCentral Storage, providing the ability to monitor and manage a large number of storage devices.
HBA	Host bus adapter. An interface between a server or workstation bus and a Fibre Channel network.
HBA port group	A group of HBA ports for which a single LUN masking operation applies to each port in the group. In CommandCentral Storage, you can create HBA port groups using the Console. For EMC EVA and CLARiiON arrays, the term host may be used to refer to an HBA port group. For NetApp devices, the term initiator group is used. See also LUN masking.
host bus adapter	See HBA.

host storage domain	See array virtual port.
hub	A common connection point for devices in the storage network. The hub may be unmanaged, IP-managed, or FC-managed. An unmanaged hub is passive in the sense that it serves simply as a conduit for data, moving the data from one storage resource to another. IP-managed and FC-managed hubs are intelligent, containing features an administrator can use to monitor the traffic passing through the hub and configure each port in the hub.
inactive zone set	A zone set available for activating on a Fibre Channel fabric. See also active zone set, zone set.
in-band	A type of Fibre Channel management protocol. The most prevalent in-band protocol over Fibre Channel is SCSI Enclosure Services (SES). Contrast with out-of-band.
initiator group	See HBA port group.
IP address	An identifier for a computer or other device on a TCP/IP network, written as four eight-bit numbers separated by periods. Messages and other data are routed on the network according to their destination IP addresses. See also virtual IP address.
iSCSI router	A storage router implementing the Internet Small Computer Systems Interface (iSCSI) protocol (SCSI over IP) to extend access of a Fibre Channel fabric and attached storage devices to IP servers. Currently, CommandCentral Storage discovers only the Cisco SN 5420 iSCSI router.
JBOD (just a bunch of disks)	A cabinet of disks.
logical unit number	See LUN.
logical volume	A simple volume that resides on an extended partition on a basic disk and is limited to the space within the extended partitions. A logical volume can be formatted and assigned a drive letter, and it can be subdivided into logical drives. See also LUN.
LUN (logical unit number)	A unique and discrete addressable unit or logical volume that may reside inside one or more simple or array storage devices. LUNs are exposed to the outside world through an addressing scheme presented to the host as SCSI LUN numbers. Each LUN has a unique device handle and represents a logical volume.
LUN binding	The creation of access paths between an addressable unit (AddrUnit) within a disk array and a port on the array. AddrUnits are storage volumes built out of the physical disks within the array. Array ports are connected to the SAN fabric and function as SCSI targets behind which the AddrUnits bound to those ports are visible.
LUN masking	The practice of enabling access to a particular addressable unit (AddrUnit) for a host on the storage network. This is done by creating an access control list

	associated with the LUN (the access path) between that AddrUnit and an array port to which it is bound. The access control list for a LUN contains the World Wide Name of each HBA port that is allowed to access that LUN within the array.
LUN Query Tool	A CommandCentral Storage tool that helps you find LUNs on your storage network that match one or more properties, such as device vendor, storage type, capacity, configuration, cost, and location. The LUN Query Tool can further refine the search for LUNs based on the groups to which they are assigned or based on their accessibility from specified SAN-attached hosts.
LUN storage	Configured storage that has been apportioned into addressable units (LUNs) and is ready to be allocated to hosts. Also called addressable storage. Contrast with available storage.
managed host	The part of CommandCentral Storage that assists the Management Server in discovering all of the resources in the storage network. The managed host is connected to the Management Server and consists of several explorers—such as the GS explorer, the SNMP explorer, and the HBA explorer—that are also used by the Management Server. Although the managed host uses a modified form of the Hardware Abstraction Layer process used in the Management Server, it is not itself a server. Prior to CommandCentral Storage version 5.x, the managed host was known as the Agent.
managed virtual host	A CommandCentral Storage managed host that is installed on a guest operating system on a virtual machine. See virtual machine.
masking	See LUN masking.
MGEX	See GS explorer.
mirroring	A form of storage redundancy in which two or more identical copies of data are maintained on separate volumes. (Each duplicate copy is known as a mirror.) Also RAID Level 1.
multipathing	Multiple physical access paths to a disk connected to a host system. Any software residing on the host (for example, the DMP driver) that hides multiple physical access paths from the user is said to provide multipathing functionality. See also Dynamic Multipathing (DMP).
NetApp unified storage	A class of storage devices in which hosts and users gain access to storage through a specialized set of protocols. The NetApp unified storage system handles both SAN and NAS transactions and makes the specifics of each networked storage model (Fibre Channel SAN, iSCSI SAN, and NAS) transparent to the user.
NetBackup	See Veritas NetBackup.
node	An object in a network. In Veritas Cluster Server, node refers specifically to one of any number of hosts in a cluster. See also object.

object A single, unique addressable entity on a storage network. It is possible for objects to be present within objects. For example, while a tape array is an object, each individual tape drive within the array is also an object. A host is an object, and the HBA inside the host is also an object. Each object has one or more attributes and can be a member of one or more zones.

object dependency group A class or collection of storage objects, such as volumes and file systems, having dependencies on a specific application. Object dependency groups are defined automatically in CommandCentral Storage. See also generic group, group.

OID (object ID) A key which uniquely identifies a discovered object in the CommandCentral Storage database. OIDs are represented in XML files as hexadecimal strings with a maximum length of 128 characters. Also called object reference.

object view A graphical display showing storage resources and information about them.

OS handle See device handle.

out-of-band A type of communication protocol other than the Fibre Channel management protocol, such as SNMP or a vendor-specific proprietary protocol. Contrast with in-band.

path The route through which a host accesses data on a storage medium such as a disk in an array. The path consists of an HBA (host bus adapter) on the host, a SCSI or Fibre Channel connector, and a controller on the disk or disk array.

physical fabric The physical components of a fabric, including all switches and all other SAN objects. You can configure one or more virtual fabrics—each one isolated from the others—based on the hardware components in the physical fabric.

policy A set of rules, or configuration settings, that are applied across a number of objects in the storage network. You establish policies to help you monitor and manage the network. Each policy associates certain sets of conditions with storage resources and defines actions to be taken when these conditions are detected. See also collector.

Policy Service See CommandCentral Storage Alert Manager.

port A connection through which a device is attached to an I/O bus or to the storage network, or the representation of this physical connection to the link hardware.

port bundle See bundle.

primary server See server.

provisioning The set of activities by which a user allocates storage to hosts and applications, for example creating LUNs in an array, setting up zoning between a host and an array, and giving the server access to the storage. CommandCentral Storage provides a set of tools, such as the LUN Masking wizard and the Zone Builder, that assist the provisioning process.

Push Install	See CommandCentral Storage Agent Push Install Utility.
QoSS (Quality of storage service)	A technique for managing storage resources to fulfill predefined service-level criteria. For each service level, or tier, policy rules are used to ensure the appropriate level of availability and performance. Also called storage tiering.
qtree	In NetApp unified storage devices, special subdirectory of the root of a volume that acts as a virtual subvolume with special attributes.
RAID	Redundant Array of Independent Disks. A set of techniques for managing multiple disks for cost, data availability, and performance. See also mirroring or striping.
rank	A storage virtualization object created from one or more IBM DS6000 or DS8000 storage arrays. The storage in ranks can be organized into extent pools. See also extent pool storage array.
raw device mapping (RDM)	A virtual disk that has a LUN directly assigned to its virtual machine without the layer of a storage pool. In this situation, the LUN is fully dedicated to the virtual machine. Additionally, the virtual disk and LUN have a one-to-one mapping.
rediscover	An operation in which up-to-date status information about managed resources is sent to the Management Server. The rediscover operation, which a CommandCentral Storage operator can initiate through the Console, can be performed for a single resource, for a device manager, or for an explorer.
resource	Any of the individual components that work together to provide services on a network. A resource may be a physical component such as a storage array or a switch, a software component such as Oracle8i or a Web server, or a configuration component such as an IP address or mounted file system.
resource type	A way of classifying resources in a cluster. Each resource is identified by its name and its resource type. Veritas Cluster Server includes a set of predefined resource types for storage, networking, and application services.
robotic library	A collection of tapes controlled and managed through firmware.
router	A device that connects two segments of a storage network and determines the optimal path along which traffic should be forwarded. Also gateway. See also bridge
SAN (storage area network)	A network linking servers or workstations to devices, typically over Fibre Channel, a versatile, high-speed transport. The storage area network (SAN) model places storage on its own dedicated network, removing data storage from both the server-to-disk SCSI bus and the main user network. The SAN includes one or more hosts that provide a point of interface with LAN users, as well as (in the case of large SANs) one or more fabric switches and SAN hubs to accommodate a large number of storage devices.

SAN Access Layer (SAL)	A component that performed discovery and access control in the SANPoint Control and CommandCentral Storage 4.x products. See Hardware Abstraction Layer (HAL).
scan	An operation that detects all resources visible to an explorer through either an in-band connection or a device manager. A CommandCentral Storage operator can initiate the scan operation through the Console. A scan is also performed routinely whenever an in-band explorer executes.
SCSI	Small Computer Systems Interface. A hardware interface that allows for the connection of multiple peripheral devices to a single expansion board that plugs into the computer. The interface is widely used to connect personal computers to peripheral devices such as disk and media drives.
SCSI bus	The communication pathway between a SCSI host adapter card and target SCSI devices. Physically, the bus begins at one end of a SCSI cable at the host adapter card and ends at the other end of the cable at the target device.
SCSI disk	A storage device (fixed disk) attached to a SCSI bus.
SCSI LUN	A division within a group of SCSI devices that identifies a sub-device. See also LUN.
server	The central point at which data is gathered, and the machine on which the CommandCentral Storage database resides. A typical configuration consists of one server (for example, the CommandCentral Storage Management Server) and several managed hosts.
SICL (Simple Instrumentation Collection Layer)	An engine, residing on the CommandCentral Storage managed host, that launches scripts and transfers the script output to the Alert Manager. Each SICL script, written for a particular vendor's device, gathers data using native techniques such as vendor CLI, log file scrubbing, and database mining.
slot	An opening in a computer or other network device into which a printed circuit board can be inserted, adding capability to the device. Also expansion slot.
SMTP	Simple Mail Transfer Protocol, a commonly used protocol for sending email messages between servers.
SnapMirror	A method of mirroring volumes and qtrees on NetApp unified storage devices. With SnapMirror, a user can schedule or initiate data transfers, request information about transfers, update a mirror, and manage mirrors. CommandCentral Storage can discover and display information about SnapMirrors. See also mirroring.
snapshot	A point-in-time image of a volume or file system that can be used as a backup.
SNMP	The Simple Network Management Protocol for Internet network management and communications used to promote interoperability. SNMP depends on

	cooperating systems that must adhere to a common framework and a common language or protocol.
soft zoning	A fabric zoning method that filters the visibility of objects on the storage network so that an object can only see other objects that share at least one zone membership with it. Unlike hard zoning, soft zoning is not enforced at the switches themselves. See also hard zoning.
storage area network (SAN)	See SAN
storage array	A collection of disks or tapes that are part of a storage subsystem, managed as a unit by a body of control software. The disks or tapes may be housed in a single physical device or in multiple devices. See also disk array tape device.
storage device	See device.
storage pool	A single entity representing a collection of LUNs. Using storage pools, storage administrators can create virtual disks of different sizes. These virtual disks can then be assigned to virtual machines.
Storage System	A NetApp unified storage device that operates using Data ONTAP software. MultiStore Virtual Systems, also known as Multistore devices, can be configured on physical filers (pfilers). See also NetApp unified storage.
storage view	A logical port defined for an array that supports SMI-S 1.1. When a storage view is defined, the array can support LUN masking with multiple, heterogeneous hosts through a single physical array port. See also array virtual port.
striping	A layout technique that spreads data across several physical disks by mapping the data to successive media, known as stripes, in a cyclic pattern. Also RAID Level 0.
subnet	A portion of a storage network typically consisting of all machines in one locale, in one building, or on the same local area network (LAN). Internet Request for Comments 950 provides the standard procedure for creating and identifying subnets.
subnet mask	A 32-bit mask that identifies the portions of an IP address to be used for locating addresses in a subnetwork.
switch	A network device to which nodes attach and which provides high-speed switching of node connections via link-level addressing.
Symantec Private Branch Exchange (PBX)	A common component that uses socket passing to reduce the number of ports required to be open across a firewall. PBX uses a paradigm similar to that of a telephone switchboard in which calls placed to a switchboard are redirected to a known extension. In the PBX exchange, client connections sent to the exchange's port are redirected to an extension associated with the CommandCentral Storage Management Server.

Symantec Product Authentication Service	A component of Veritas Security Services (VxSS) that is used by CommandCentral Storage to provide user authentication. Authentication Service is a set of processes and runtime libraries that enables users to log on to multiple Veritas products with one login. See also Symantec Product Authorization Service.
Symantec Product Authorization Service	A common component, also known as VRTSaz, that provides a centralized access control decision-making service. After the Authentication Service has validated user identities, the Authorization Service makes access control decisions, determining whether specific users have the authority to perform specific tasks on specific resources being protected by authorization. The Hardware Abstraction Layer (HAL) is the only part of CommandCentral Storage to use the Authorization Service, using it to control access for inter-process communication. See also Symantec Product Authentication Service.
system	The physical hardware on which data and applications reside, and the connections between them.
tape device	A storage device that writes data to tape. CommandCentral Storage identifies a tape drive, tape transport, and tape arrays as a tape device.
tape mark	A mark that is recorded between backup images on a tape.
Task Manager	A CommandCentral Storage Management Server component that manages user-initiated requests to requests to change the status or configuration of objects in the network and to add, edit, and delete users. The Task Manager maintains a list of completed, pending, and active tasks. The list can be viewed using the Console Task Status tab.
topology	The physical or logical arrangement of resources on the storage network and the connections between them.
Topology Map	A graphical representation of the physical or logical arrangement of storage resources in the network. The Topology Map depicts both the objects on the network and the connections between them. In CommandCentral Storage, the Topology Map displays on the Console's Topology tab.
unallocated storage	LUNs that have not yet been allocated. A LUN is considered allocated when a host operating system has written a device handle for the LUN (in other words, claimed the LUN) or when the array has masked the LUN to a specific target. Contrast with allocated storage
unclaimed storage	Storage that has been allocated to hosts whose operating systems have not yet written device handles. This is usually wasted storage. Contrast with claimed storage
unconfigured storage	Physical storage that has yet to be formatted. Contrast with configured storage
unidentified adapter	An HBA or storage device that has logged into a Fibre Channel switch and about which CommandCentral Storage has no information. For HBAs, this can occur

	when the SAN runs an unsupported HBA card or driver version, there is no managed host attached to the HBA, or the Management Server is not configured to communicate with the managed host. For storage devices, this can occur when no LUNs are visible to a managed host (usually due to zoning or LUN masking security).
unified logging	A common logging library used by Symantec products and components to log information about errors and other events. CommandCentral Storage users can manage and view these logs using Symantec common log tools: `hallog`, `vxlogmgr`, `vxlogview`, `vxlogcfg`, and `vxloggen`.
unified storage	See NetApp unified storage
unused storage	Storage to which data has not been written. Contrast with used storage
used storage	The portion of storage allocated to a file system or database to which data has been written, expressed as a quantity (such as 10 GB). Contrast with unused storage
VAIL (Veritas Array Integration Layer)	A single, unified means for presenting information about disk storage array subsystems to a variety of storage management software products including the CommandCentral Storage offering. VAIL has a configuration tool—`vaildiag`—with which you can configure VAIL providers to manage disk storage arrays.
VEA (Veritas Enterprise Administrator)	A separate middleware server used by the SAN Access Layer and other processes to provide client-server communication. The VEA infrastructure enables software components to share information about objects, manage those objects, and effect change on those objects.
Veritas Array Integration Layer	See VAIL.
Veritas Cluster Server (VCS)	An open systems clustering solution that minimizes planned and unplanned downtime, simplifies server consolidation, and allows the effective management of a wide range of applications in multiplatform environments.
Veritas Cluster Server cluster	A cluster consisting of multiple systems connected in various combinations to shared storage devices. Cluster Server monitors and controls applications running in the cluster and can restart applications in response to a variety of hardware or software faults. A cluster is defined as all systems with the same cluster identification and connected via a set of redundant heartbeat networks. Clusters can have from one to 32 member systems, or nodes.
Veritas Cluster Server service group	A set of resources working together to provide application services to clients. For example, a Web application service group might consist of: disk groups on which the Web pages to be served are stored; a volume built in the disk group; a file system using the volume; a database whose table spaces are files and whose rows contain page pointers; the network interface card or cards used to export the Web service; one or more IP addresses associated with the network card(s); the application program and associated code libraries. Cluster Server performs

	administrative operations on resources, including starting, stopping, restarting, and monitoring at the service group level.
Veritas NetBackup	A Symantec product family that provides a fast, reliable backup and recovery solution for environments ranging from terabytes to petabytes in size. The term NetBackup refers to either of two products that interact with the CommandCentral Storage product: Veritas NetBackup DataCenter and Veritas NetBackup BusinesServer.
Veritas Volume Manager	A Symantec product installed on storage clients that enables management of physical disks as logical devices. Veritas Volume Manager enhances data storage management by controlling space allocation, performance, data availability, device installation, and system monitoring of private and shared systems.
virtual fabric	A storage area network (SAN) technology in which a group of switches and other objects constitute a hardware-based, isolated environment within a physical fabric. Virtual fabrics create multiple, isolated SAN environments within a physical SAN fabric in order to enable more efficient use of the SAN, especially in terms of availability and scalability. Also called virtual SAN or VSAN.
virtual hub	A set of switch ports on the same fabric that are placed into a logical grouping and use an address spoofing mechanism to emulate a Fibre Channel Arbitrated Loop (FC-AL) hub. A virtual hub can be comprised of all the ports on a single switch or several ports on one or more switches. It is used primarily to allow older loop-only devices to be attached to a switched fabric and be accessible as though they were fabric capable.
virtual IP address	A unique IP address associated with a VCS cluster. This address can be used on any system in the cluster, along with other resources in the VCS cluster service group. A virtual IP address is different from a system's base IP address, which corresponds to the system's host name. See also IP address.
virtual machine	An environment or software container that does not physically exist but is created in another environment. A virtual machine can run its own operating systems and applications as if it were a physical computer.
virtual SAN	See virtual fabric.
virtualization	A method of representing one or more objects, services, or functions as a single abstract entity so that they can be managed or acted on collectively. An example of virtualization is the creation of a virtual fabric from a switch and associated storage resources as a means of controlling access and increasing scalability in the storage network.
virtualization server	A server that hosts multiple virtual machines with the help of a virtualization application, such as VMware. The virtualization server provides virtualization data to the Management Server.
visible storage	Allocated LUNs that are zoned to a host.

volume In storage media managed by Veritas Volume Manager, a virtual disk made up of a portion or portions of one or more physical disks and representing an addressable range of disk blocks. It is used by applications such as file systems or databases.

In an IBM DS6000 or DS8000 array, an addressable unit (LUN) that is created from an extent pool. See also extent pool

In a NetApp unified storage device, a file system holding user data that is accessible through one or more of the access protocols supported by Data ONTAP, including NFS, CIFS, HTTP, WebDAV, FTP, FCP and iSCSI. Each volume depends on its containing aggregate for all of its physical storage—that is, for all storage in the aggregate's disks and RAID groups. See also aggregate

Volume Manager See Veritas Volume Manager.

VRTSaz See Symantec Product Authorization Service.

VSAN See virtual fabric.

VxPBX See Symantec Private Branch Exchange (VxPBX).

Web Engine See CommandCentral Storage Web Engine.

World Wide Name (WWN) A registered, 64-bit, unique identifier that is assigned to nodes and ports.

XML (Extensible Markup Language) A specification developed by the W3C. XML allows designers to create custom tags to enable flexibility in sharing and displaying Web documents.

zone A named subset of nodes and ports (zone members) on a single fabric. On a SAN, fabrics secure data from unwanted access by restricting the interconnectivity between nodes belonging to different zones.

zone alias A symbolic name assigned to a device or group of devices on a SAN fabric. By creating a zone alias, you can assign a familiar name to a device, or you can group multiple devices into a single name. A zone alias must be a unique alphanumeric string beginning with an alpha character. The underscore character (_) is allowed, and zone alias names are case sensitive.

zone member An object (node or port) that belongs to a zone. An object can be a member of more than one zone.

zone membership For an object (node or port) on a SAN, the state or status of being a member of a specific zone. A zone member can communicate only with other objects that are members of the same zone—in other words, with objects that share at least one zone membership with it.

zone set A set of zone definitions for a single Fibre Channel fabric. Zone sets are useful for defining and enforcing access restrictions that change, for example, at different times during the day. A zone can belong to more than one zone set; however, only one zone set for a given fabric can be active at one time.